Publication No. 74-e41

WA-CR-1010

MEMORANDUM

March 21, 1974

TO: Dick Burkhalter and John Stetson

FROM: Grover Scott Jeane II

SUBJECT: Survey of Columbia River Between Longview and Cathlamet, Washington

A lowflow survey of the Columbia River was undertaken in late September, 1973. The purpose of the survey was to determine the area and magnitude of the dissolved oxygen sag exerted by the Longview Fibre Mill and Weyerhaeuser Pulp Mill at Longview. The sag was originally detected by a water quality monitor our section had installed at Port Westward in response to your request.

The survey area extended downstream from Prescott, Oregon, to below Wauna, Oregon. Three separate survey trips were completed (September 21, 24, and 25). The September 21 sampling trip was a pilot study to establish the maximum downstream excursion of the oxygen sag (see Figure 2). This trip took place late on the ebb tide. Only midchannel stations were sampled.

Extensive river sampling took place during the September 24 and 25 trips. Composite mill effluents were collected from both mills in conjunction with the river sampling. A cross section was taken at each river station. Example: Station 1 was located at Prescott, Oregon. Station 1A was 1/4 of the river width from the Washington side; 1B was at midchannel; and 1C was 1/4 of the river width from the Oregon side. Surface, mid-depth, and bottom samples were collected at most stations.

The September 24 survey took place on the mid-ebb tide. The September 25 survey was centered around a slack flood tide.

Results:

Dissolved oxygen values ranged between 8.0 and 9.0. The maximum dissolved oxygen percent saturation depression measured was 8% (94% saturation to 86% saturation). The area of the sag measured ranged from 10 to 15 nautical miles. Port Westward, Oregon, is the midpoint of the dissolved oxygen sag area. No correlation between dissolved oxygen depression and total suspended solids was found. Total and fecal coliform levels were similar above and below Longview. Total coliform averaged 9000 colonies/100 ml. and fecal coliform averaged 700 colonies/100 ml. Chemical oxygen demand of the receiving water averaged 8 mg/l. The average PBI value was 16 mg/l.

The results of the composite mill effluent analyses are depicted in Table 1. Two points of interest are the high bacteria loadings of both mills and the acidic condition of Weyerhaeuser's AC sewer.

Summary:

The dissolved oxygen sag occurs mainly on the Washington side of the Columbia River. The sag area covers approximately 10 to 15 nautical miles, with the center located at Port Westward, Oregon. The maximum oxygen percent saturation depression was 8% (94% to 86%). Dissolved oxygen values rarely decreased below 8 mg/l. No correlation was noted between dissolved oxygen values and total suspended solids or bacteria. The biological oxygen demand, bacteria, and total suspended solids loading from the two mills are high but only minor effects were measured in the receiving water.

The data indicates that the effluents from both mills does not have a major impact on water quality of the Columbia River. The scope of the survey was to measure only gross indicators of pollution. No attempt was made to evaluate impact upon the local aquatic ecosystem by the use of sensitive biological parameters.

GSJ:bjj

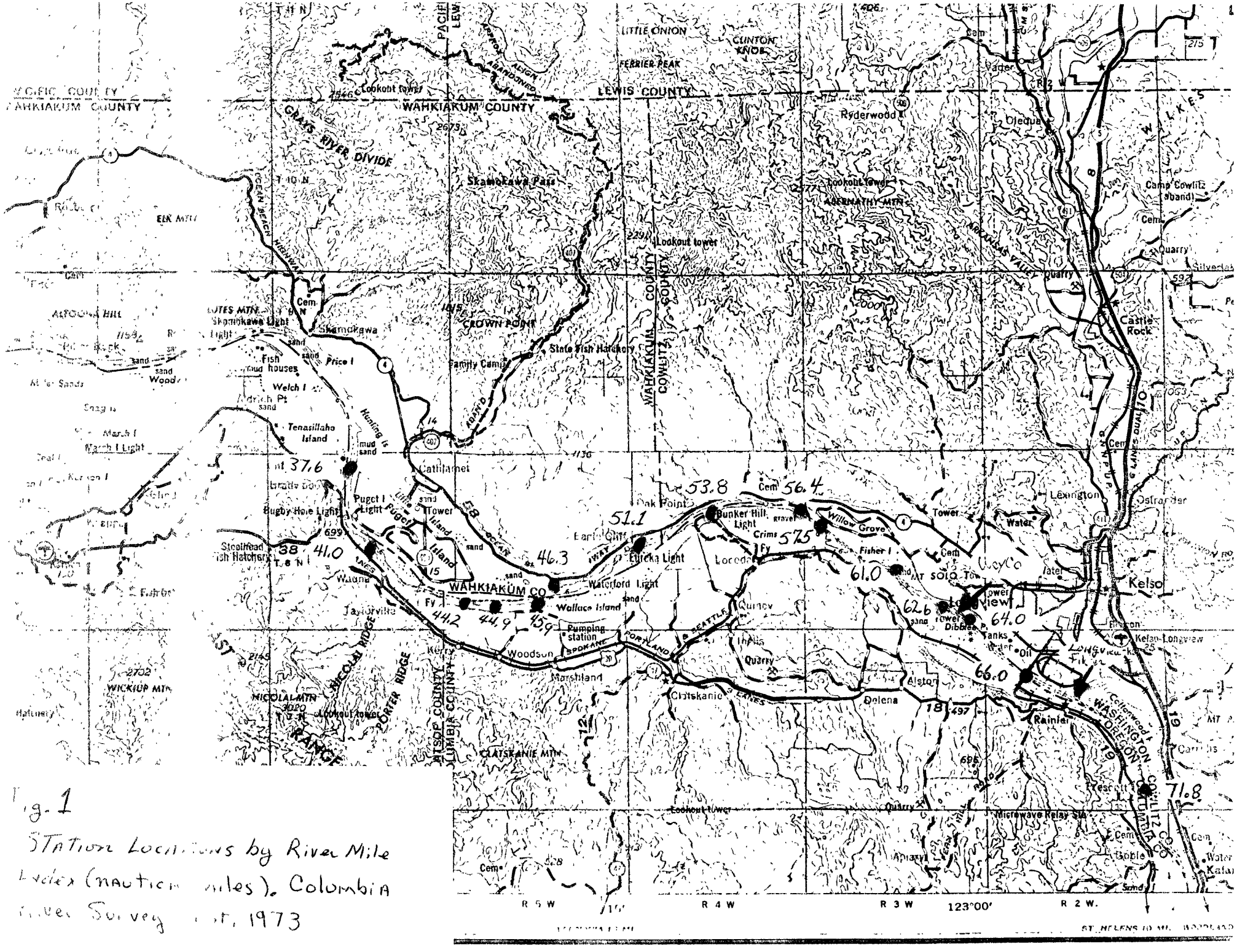

Fig. 1

Station Locations by River Mile Leaders (nautical miles), Columbia River Survey, 1973

Scale 1:250,000

Table 1 Composite Mill Effluents - Columbia River Survey.

Weyerhaeuser at Longview				Longview Fibre		
AC Sewer		Clarifier		Clarifier Composite Effluent		
9/24	9/25	9/24	9/25	9/24	9/25	
68465	58982	156886+	101742	60079	58590	BOD*
28262	39192	27455	40457	49982	42701	T.S.S.*
3.3	3.2	6.9	7.3	8.0	7.4	pH
<1000	>40000	1.6×10^7	>800000	140000	<40000	Total Coliform**
-----	-----	>50000	<200	<1000	440	Fecal Coliform**
<400	>4000	>40000	<10000	16000	<10000	Fecal Streptococci**

* = pounds per day
** = colonies per 100 ml.

Figure 2 - p. 1

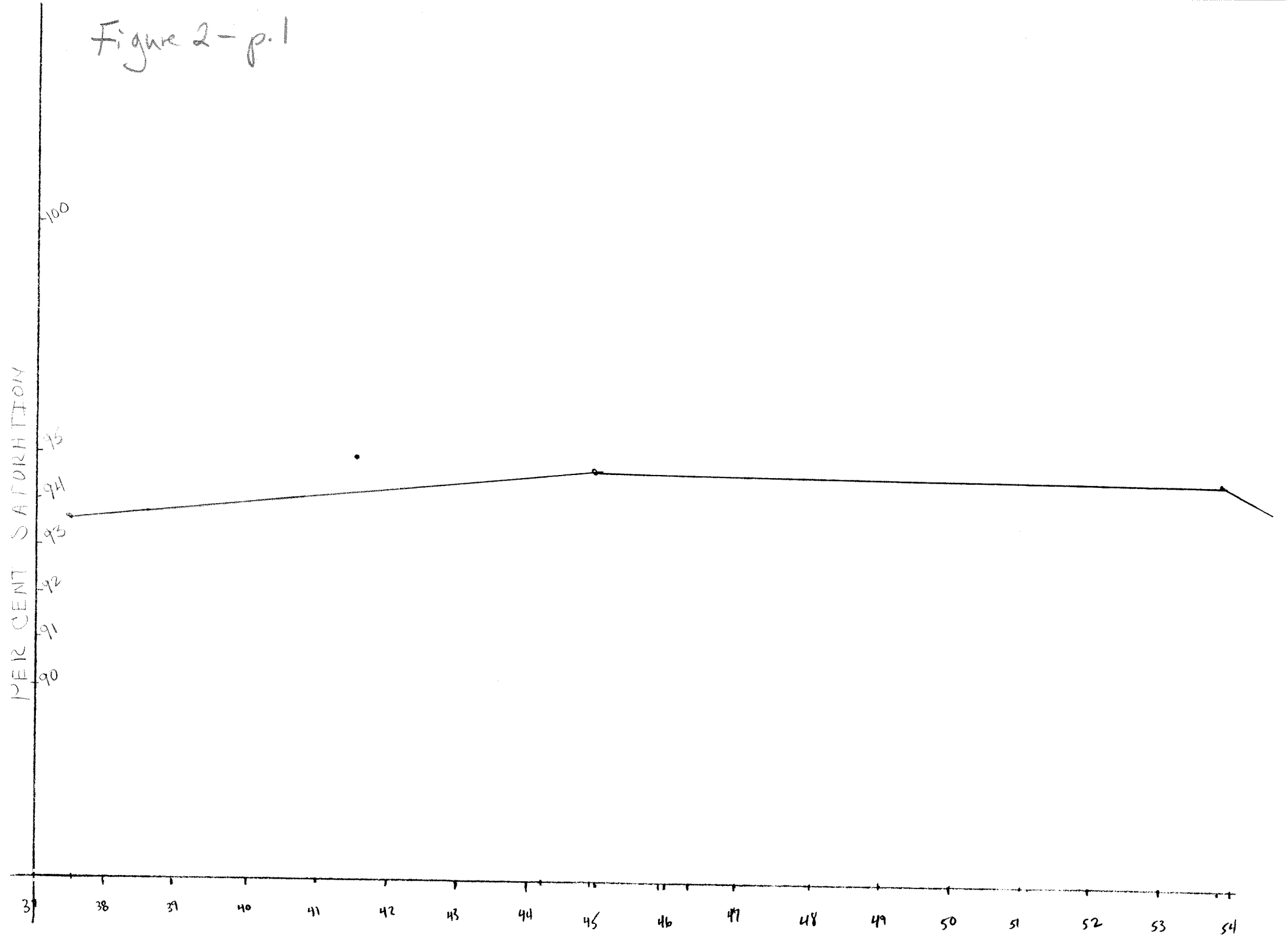
PER CENT SATURATION
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Figure 2- p 2

Fig 2 Dissolved Oxygen % Saturation
September 21
Columbia River
1973

All values mid-channel.

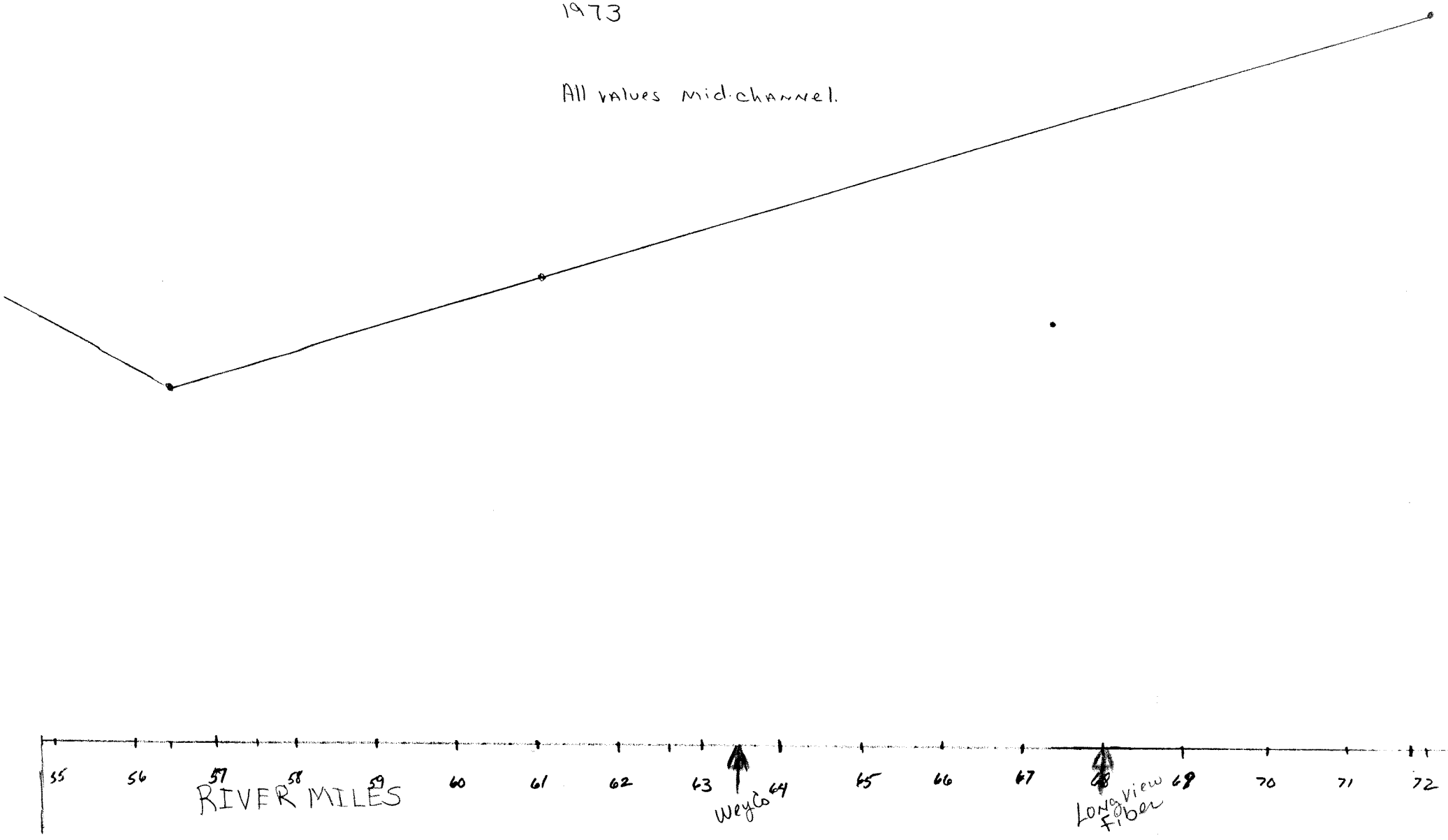

Figure 3-p.1

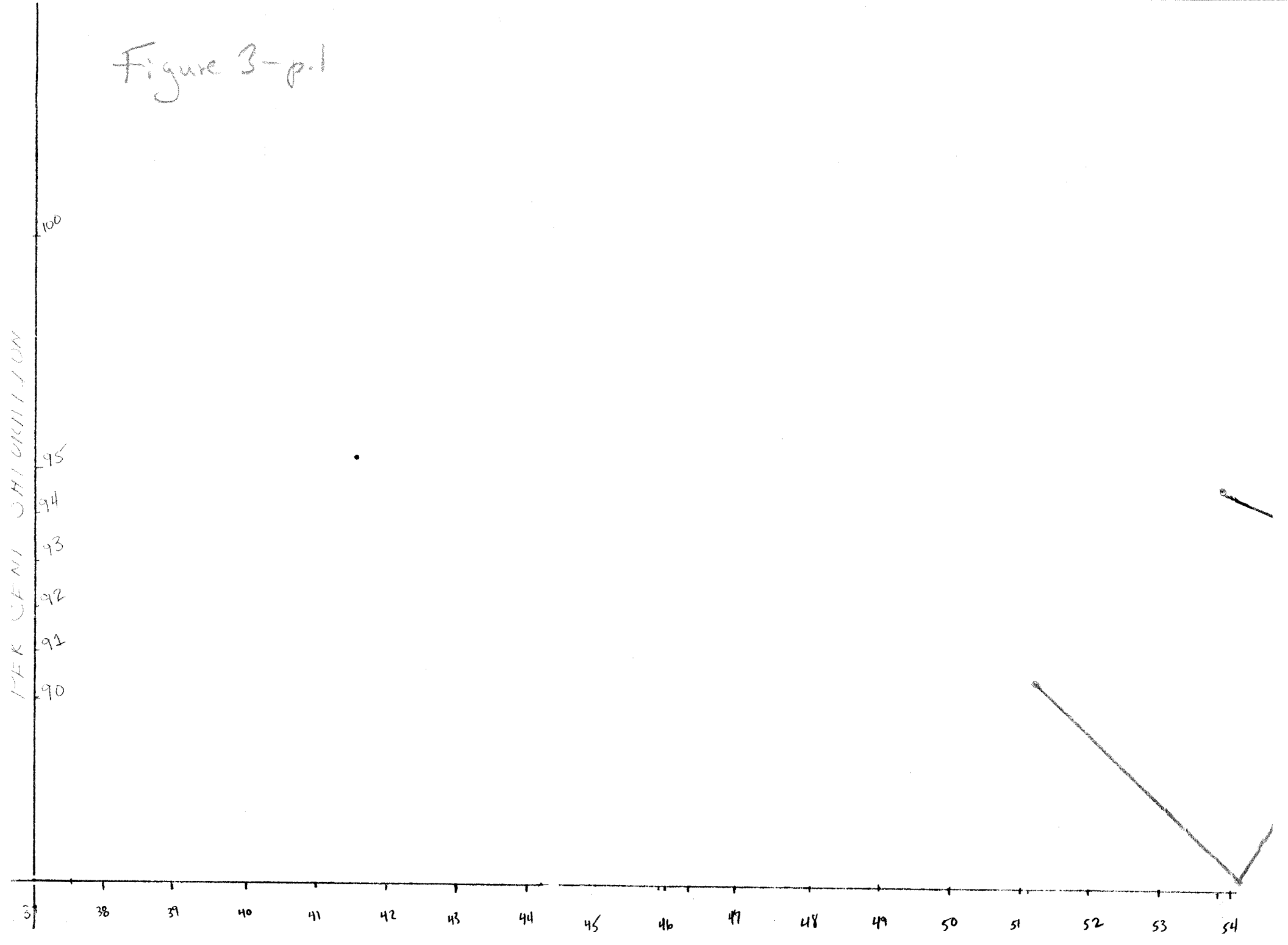
PER CENT SATISFACTION
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Fig 3 Dissolved Oxygen % Saturation
September 24
Columbia River
1973

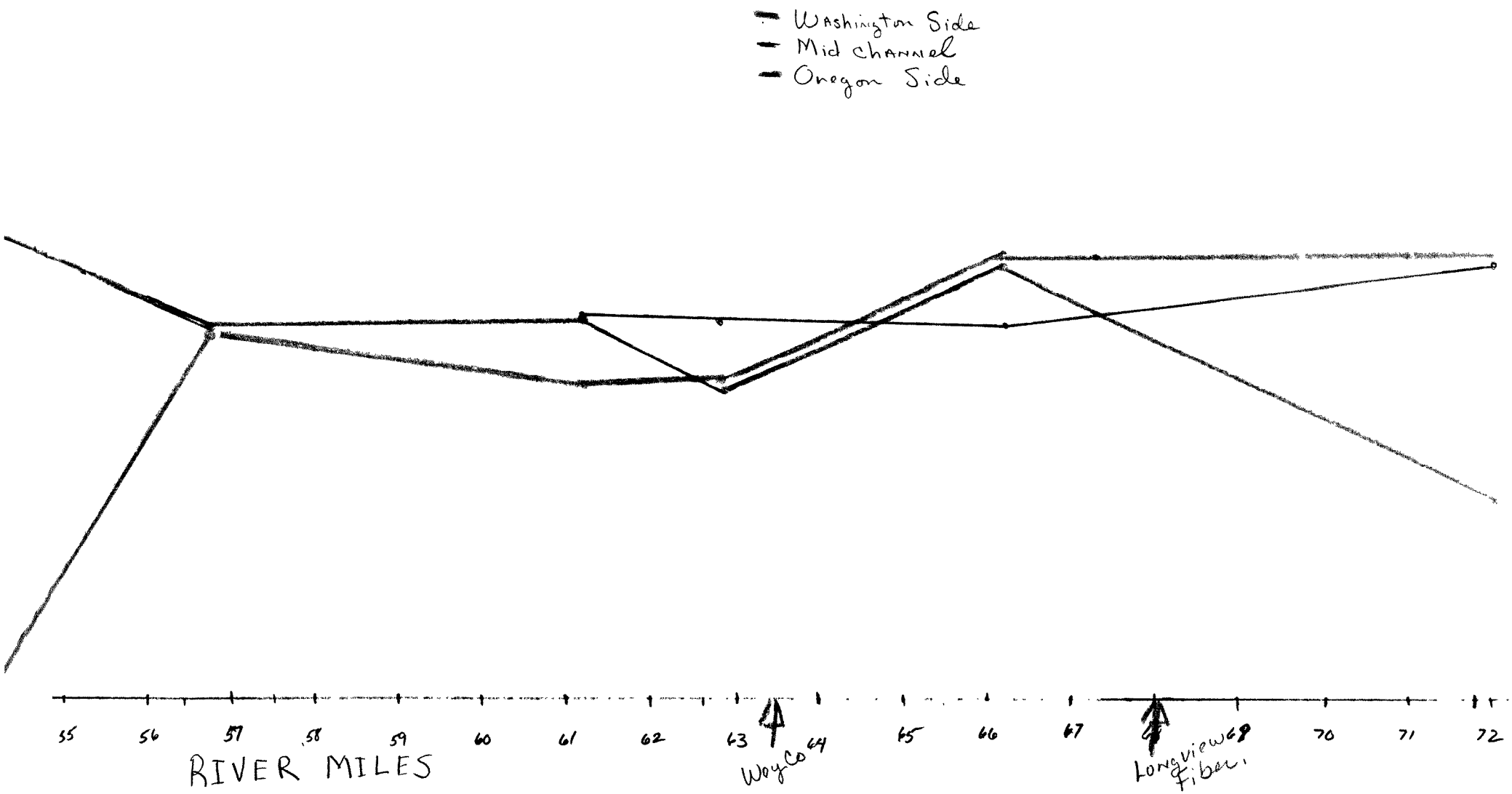
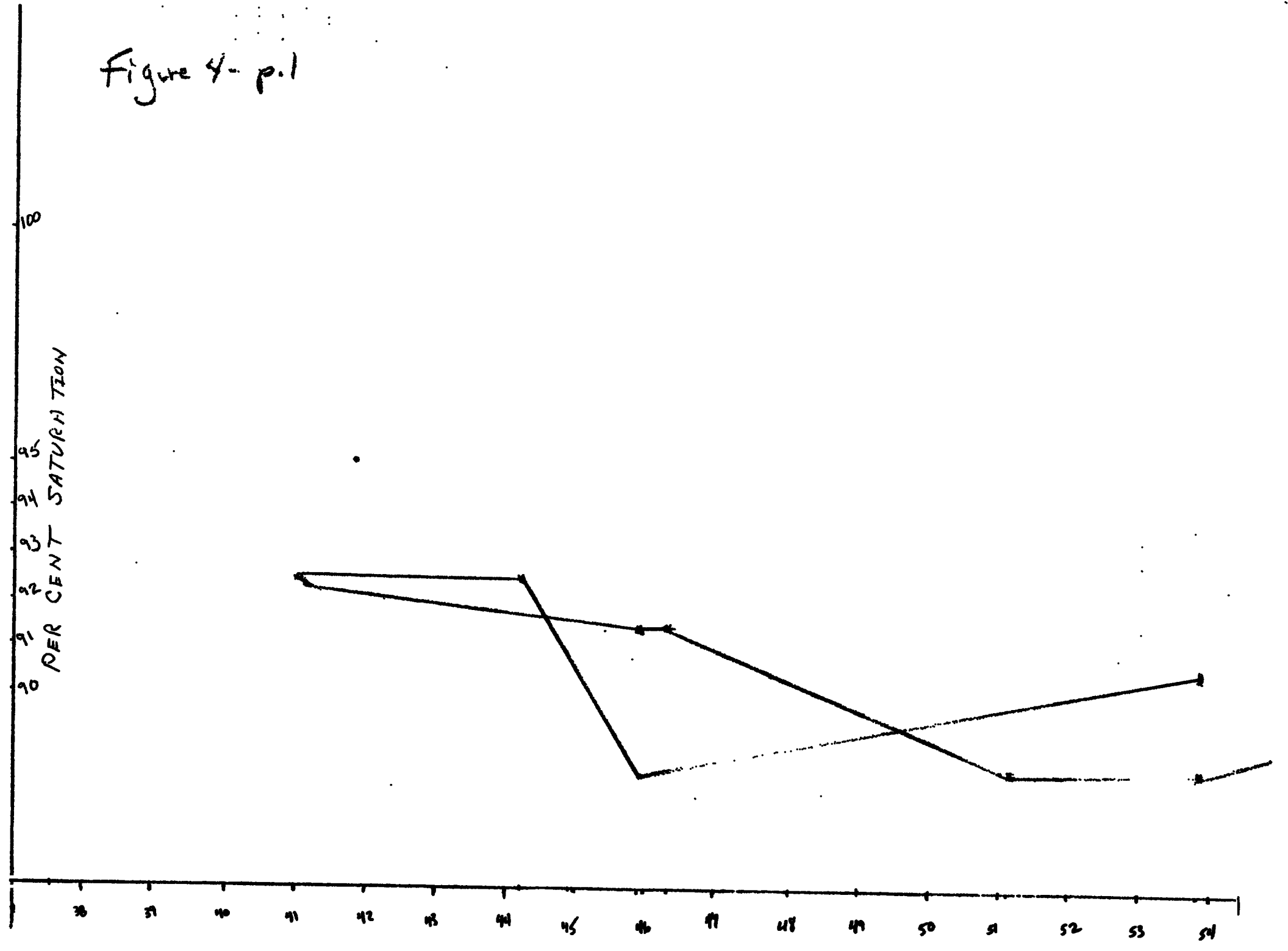


Figure 4- p.1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PER CENT SATURATION
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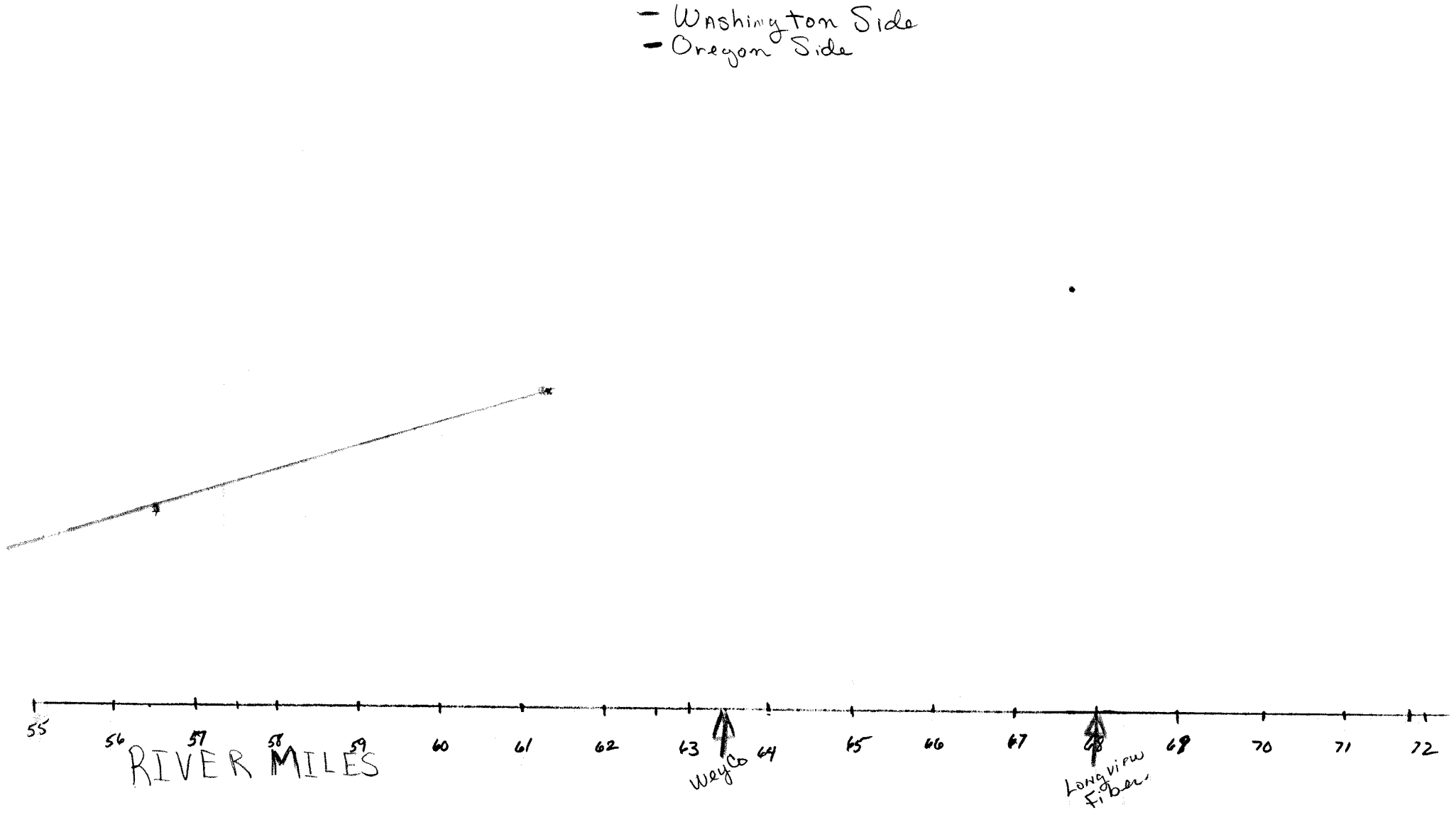
Figure 4 - p. 2

Fig 4 Dissolved Oxygen % saturation September 25.
Columbia River Survey
September, 1973



April 8, 1974

State of Washington
Department of Ecology

Memo to: Dick Burkhalter and John Stetson

From: Grover Scott Jeane II

Subject: Columbia River Survey, 1973.

Please attach these tables to the previous memo (Oxygen Saturation in the Columbia River near Longview) as a clarification of the graphs.

GSJ:jmh

Table II. Columbia River Water Quality Data Collected September 21, 1973.

River Mile	Station	Depth (Ft.)	Temp. (°C)	Dissolved Oxygen (mg/l)	Per Cent Saturation	Time
71.8	B*	5'	18.0	9.3	101.1%	1445
"	"	25'	18.0	9.2	100.0%	"
"	"	40'	18.0	9.2	100.0%	"
61.0	B	5'	18.0	8.9	96.7%	1500
"	"	25'	17.5	8.9	95.7%	"
"	"	45'	17.5	8.8	94.6%	"
56.4	B	5'	17.5	8.8	94.6%	1530
"	"	25'	18.0	8.7	94.6%	"
"	"	40'	17.5	8.6	92.5%	"
53.8	B	5'	17.5	9.0	96.8%	1600
"	"	25'	17.5	8.9	95.7%	"
"	"	45'	17.5	8.9	95.7%	"
"	"	60'	17.5	8.8	94.6%	"
44.9	B	5'	17.5	8.8	94.6%	1630
"	"	25'	17.5	8.8	94.6%	"
"	"	40'	17.5	8.8	94.6%	"
37.6	B	5'	17.5	8.8	94.6%	1700
"	"	25'	17.5	8.8	94.6%	"
"	"	40'	17.5	8.7	93.5%	"

*A = Washington Side
B = Midchannel
C = Oregon Side

Table III. Columbia River Water Quality Data Collected September 24, 1973.

River Mile	Station	Depth (Ft.)	Temp. (°C)	Dissolved Oxygen (mg/l)	Per Cent Saturation	Time
71.8	A*	1'	17.5	8.9	95.7%	1135
"	"	20'	"	8.8	94.6%	"
"	"	36'	"	8.7	93.5%	"
71.8	B	1'	17.5	8.7	93.5%	1220
"	"	20'	"	8.7	93.5%	"
"	"	45'	"	8.7	93.5%	"
71.8	C	1'	17.5	8.6	92.5%	1240
"	"	20'	"	8.7	93.5%	"
"	"	50'	"	8.3	89.2%	"
66.0	A	1'	17.5	8.8	94.6%	1320
"	"	20'	"	8.7	93.5%	"
"	"	44'	"	8.8	94.6%	"
66.0	B	1'	17.5	8.9	95.7%	1330
"	"	20'	"	8.6	92.5%	"
"	"	45'	"	8.7	93.5%	"
66.0	C	1'	17.5	8.7	93.5%	1355
"	"	20'	"	8.7	93.5%	"
"	"	35'	"	8.7	93.5%	"
62.6	A	1'	18.7	8.8	94.6%	1435
"	"	20'	17.5	8.8	94.6%	"
"	"	55'	"	8.5	91.4%	"
62.6	B	1'	17.5	8.7	93.5%	1440
"	"	20'	"	8.6	92.5%	"
"	"	55'	"	8.7	93.5%	"
62.6	C	1'	17.5	8.9	95.7%	1455
"	"	20'	"	8.8	94.6%	"
"	"	35'	"	8.5	91.4%	"
61.0	A	1'	17.5	8.9	95.7%	1525
"	"	20'	"	8.5	91.4%	"
"	"	40'	"	8.5	91.4%	"
61.0	B	1'	17.5	9.0	96.8%	1540
"	"	20'	"	8.6	92.5%	"
"	"	38'	"	8.6	92.5%	"
61.0	C	1'	17.5	8.9	95.7%	1550
"	"	20'	"	8.7	93.5%	"
"	"	45'	"	8.6	92.5%	"

Table III. (Cont.)

River Mile	Station	Depth (Ft.)	Temp. (°C)	Dissolved Oxygen (mg/l)	Per Cent Saturation	Time
56.4	A	1'	17.5	8.6	92.5%	1620
"	"	20'	"	8.6	92.5%	"
"	"	38'	"	8.6	92.5%	"
56.4	C	1'	17.5	8.8	94.6%	1635
"	"	10'	"	8.6	92.5%	"
"	"	20'	"	8.7	93.5%	"
53.8	A	1'	17.5	8.5	91.4%	1715
"	"	20'	"	8.3	89.2%	"
"	"	65'	"	8.0	86.0%	"
53.8	C	1'	17.5	8.8	94.6%	1655
"	"	20'	"	8.9	95.7%	"
"	"	65'	"	8.9	95.7%	"
51.1	A	1'	17.5	8.4	90.3%	1735
"	"	20'	"	8.4	90.3%	"
"	"	45'	"	8.4	90.3%	"

*A = Washington Side
B = Midchannel
C = Oregon Side

Table IV. Columbia River Water Quality Data Collected September 25, 1973.

River Mile	Station	Depth (Ft.)	Temp. (°C)	Dissolved Oxygen (mg/l)	Per Cent Saturation	Time
61.0	A*	1'	17.5	8.6	92.5%	1240
"	"	40'	"	8.5	91.4%	"
56.4	A	1'	17.5	8.3	89.2%	1315
"	"	20'	"	8.3	89.2%	"
"	"	38'	"	8.3	89.2%	"
53.8	A	1'	17.5	8.2	88.2%	1340
"	"	20'	"	8.2	88.2%	"
"	"	64'	"	8.2	88.2%	"
53.8	C	1'	17.5	8.7	93.5%	1350
"	"	20'	"	8.5	91.4%	"
"	"	64'	"	8.4	90.3%	"
51.1	A	1'	17.5	8.3	89.2%	1400
"	"	45'	"	8.2	88.2%	"
46.3	A	1'	17.5	8.6	92.5%	1420
"	"	20'	"	8.5	91.4%	"
45.9	A	1'	17.5	8.7	93.5%	1435
"	"	Bottom	"	8.5	91.4%	"
45.9	C	1'	17.5	8.8	94.6%	1450
"	"	Bottom	"	8.2	88.2%	"
44.2	C	1'	17.5	8.6	92.5%	1535
"	"	Bottom	"	8.7	93.5%	"
41.0	A	1'	17.5	8.7	93.5%	1510
"	"	Bottom	"	8.6	92.5%	"
41.0	C	1'	17.5	8.7	93.5%	1520
"	"	Bottom	"	8.6	92.5%	"

*A = Washington Side
B = Midchannel
C = Oregon Side

LONGVIEW FIBRE COMPANY
MAIN OFFICE AND MILLS, LONGVIEW, WASHINGTON 98632

October 22, 1973

Mr. Ron Pine
Central Operations Division
S. W. Washington Regional Office
Department of Ecology
P. O. Box 829
Olympia, Washington 98501

Dear Ron,

The samples split with your laboratory have been tested and the results are shown below.

Date	Suspended Solids Mg/1	Suspended Combustible Solids Mg/1	BOD ppm
9-23-73	102	90	138
9-24-73	86	78	140

The SS and SCS tests were run by the Whatman 40 method. 500 ml was filtered in each case.

Sincerely yours,

R. G. Wirtz
Mill Effluent Supervisor

/lc

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

WATER QUALITY LABORATORY

ORIGINAL TO: S. Jeane

COPIES TO:

LAB FILES

DATA SUMMARY

Source: Columbia River Survey — Collected By: R. Pine

Date Collected: 9-24,25-73 — Goal, Pro./Obj.:

Log Number: 73-	3468	3469	3470	3537	3538	3539						STORET
	9-24			9-25								
Station:	WEYCO @ LONG. UNT. EFF	LONGVIEW @ LONG. CLAR. EFF	LONG-VIEW FIBRE	LONGVIEW F. COMP EFF	WEYCO @ LONG. COMP. EFF	CLAR. EFF						
pH	3.3	6.9	8.0	7.4	3.2	7.3						00403
Turbidity (JTU)												00070
Conductivity (umhos/cm)@25°C												00095
COD												00340
BOD (5 day)	172	>400	119	118	152	254						00310
Total Coliform (Col./100ml)	<1000	$>1.6\times10^6$	140,000	$<4\times10^4$	$>4\times10^4$	$>8\times10^5$						31504
Fecal Coliform (Col./100ml)	—	$>5\times10^4$	<1000	440	—	<200						31616
NO3-N (Filtered)												00620
NO2-N (Filtered)												00615
NH3-N (Unfiltered)												00610
Org. Kjeldahl-N (Unfiltered)												00625
Ortho-PO4-P (Filtered)												00671
Total Phos.-P (Unfiltered)												00665
Total Solids	-	-	-	-	-	-						00500
Total Non Vol. Solids	-	-	-	-	-	-						
Total Suspended Solids	71	70	99	86	101	101						00530
Total Sus. Non Vol. Solids	12	1	28	7	36	27						
Fecal Strep (col/100ml)	<400	$>4\times10^4$	>16,000	<10,000	>4000	<10,000						

Note: All results are in PPM unless otherwise specified. ND is "None Detected"
Convert those marked with a * to PPB (PPM X 10^3) prior to entry into STORET

Summary By: Stephen D. Roll — Date: 10-4-73

State of Washington Department of Ecology

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

WATER QUALITY LABORATORY

DATA SUMMARY

ORIGINAL TO: S. Jeanne
COPIES TO:
LAB FILES

Source Columbia R. Survey — Collected By G.S.J., PML, D.A.

Date Collected 9/24-25/73 — Goal, Pro./Obj.

Colonies/100 ml

Lab No.	Station	PBI	Total Coliform	Fecal Coliform	T.S.S.	T.S.N.V.S.	SCS	COD		Station as used in report.
3-347	1A 1'	7	9000	>800	12	9	3			1A surf.
72	2A 1'	0			12	9	3			1B surf.
73	3A 1'	11	>8000	580	12	10	2			1C surf
74	7A 1'	16	>8000	>800	8	6	2			8A surf
75	8A 1'	11			9	6	3			8B surf
76	9A 1'	16	7500	680	10	6	4			8C surf
77	16A 1'	18	>8000	380	8	7	1	8		4A surf
78	1B 20'	16			15	12	3			1A mid
79	2B 20'	11			14	10	4	8		1B mid
80	3B 20'	14			13	9	4			1C mid
81	7B 20'	23			11	7	4	8		8A mid
82	16B 20'	23			16	10	6	12		4A mid
83	1C 35'	16			14	10	4			1A bottom
84	2C	11			13	10	3			1B bottom
85	7C 55'	23			12	7	5			8A bottom

Note: All results are in PPM unless otherwise specified. ND is "None Detected"

Summary by Tyler D. Hall Date 10-26-73